

REMARKS/ARGUMENTS

Reconsideration is again respectfully requested of the Final Office Action of March 25, 2008, relating to the above-identified application. Applicants are also responding to the comments in the Advisory Action of September 23, 2008.

A Notice of Appeal was filed September 25, 2008, to maintain pendency of this application.

The claims in the case are: Claims 1, 2, 4, 6, and 8 to 14.

Applicants acknowledge the courtesy extended to applicants' counsel by the Examiner and his Supervisor for the telephonic interview of November 13, 2008.

For purposes of the interview, applicants had submitted a proposed amendment. However, upon reconsideration, applicants wish to continue examination with respect to all claims presently in the application.

Reconsideration is respectfully requested of the rejection of Claims 1 and 13 under 35 U.S.C. § 103(a) as unpatentable in view of *Hartmann, et al.*, (US 5,959,005) taken with *Menon, et al.*, (US 6,159,540).

Hartmann, as pointed out in the previous responses is assigned to the same assignee as the present application and describes a method to produce a surface modified, hydrophobic silanized, silica powder with specifically defined physico-chemical properties as shown in Claim 1 (col. 2, lines 38-60). There is one, and only one, surface modifying substance disclosed by *Hartmann* whereby the pyrogenically produced silica is surface modified and that is the substance known as HMDS (Hexamethyldisilazane). The surface-modified silica of *Hartmann* also can be structure-modified (destructured). As is well known, the term "destructured silica" is

understood in this art to refer to silica that has been subjected to mechanical action, such as ball milling to alter the properties of the silica.

Hartmann shows that the destructuring of the silica can be done by means of a vertical ball mill, see col. 2, line 19. The resulting product can be ground by an air jet mill in order to destroy the grit in the powder (see the example in col. 2, line 15-36).

The surface modified and destructured silica, according to the US 5,959,005 patent (*Hartmann*), is used as a filler in polymers like 2K-RTV silicone rubber (see the example in col. 2). According to col. 1, line 54, the silica can be used as a free-flow agent, particularly with fire extinguishing powders.

Hartmann (US 5,959,005) uses HMDS (Hexamethyldisilazane) only and does not mention or suggest any other surface modifying agents of any kind.

According to the present invention, applicants' silicas are surface modified with silanes having the formula $(\text{RO})_3\text{SiC}_n\text{H}_{2n+1}$ or with silanes which will result in dimethylsilyl and/or monomethylsilyl groups attached to the surface of the silica. The silane I (hexadecyltrimethoxysilane) and silane II (octyltrimethoxysilane) are particularly preferred (see paras. [0030-0032] and the examples in Table 5).

The data on pg. 9, in Table 17 (paras. [0108-0109]), is presented to show that the silicas according to the examples of the invention have a markedly smaller sieve residue and hence agglomerate content than the comparison products AEROSIL™ 200, AEROSIL™ R972 and AEROSIL™ R8200. The latter three are all prior known silicas produced by the

assignee. Reduction in sieve residue and agglomerate content is a beneficial result of the invention. The significance of the sieve residue as a measure of reduced caking is discussed in [0103].

It is to be particularly noted that AEROSIL™ R8200 is the silica according to *Hartmann* (US 5,959,005) and the sieve residue is much larger; see Table 17.

The Advisory Action of August 13, 2008, challenged the data in Table 17 on the basis that after mixing for 60 minutes, the AEROSIL R8200 has a lower sieve residue. The Advisory Action then says it is not clear how the silicas of example 9, 2 and 7 in Table 17 show unexpectedly better results.

However, attention is invited to the data relative to 5 minutes after mixing. The data relating to what happens after 5 minutes of mixing shows that the sieve residue of the AEROSIL R2800 is much higher (29.0%) than the sieve residues of example 9, 2 and 7 of the invention (25.5%, 11.0% and 11.0% respectively).

The data in Table 17 can be better understood by referring to what is the practical effect and significance of this difference, and that is the mixing time needed to obtain good quality mixed fire extinguishing powders with the silicas of the present invention is shorter than the mixing time required when using the silica representative of *Hartmann*.

This significant improvement in mixing times to obtain the intended product could not have been predicted from *Hartmann*. In other words, the data in Table 17 shows that the

silicas of the invention as compared to *Hartmann's* AEROSIL R8200 are more quickly mixed with pulverulent materials.

The difference in behavior between the products of this invention and the products of *Hartmann* could not have been predicted. The improvements in fluidisability (Table 13), resistance to caking (Tables 14-16) and reduced sieve residue (Table 17) are important properties for a commercial product and are not foreshadowed by *Hartmann*.

Hartmann shows only the modification of silica with HMDS and is not concerned with the problem of mixing silica with pulverulent materials. *Hartmann* contains no teaching as to how to reduce mixing times with pulverulent materials. And neither does the *Menon* patent.

The *Menon* patent is directed to a method of treating silica comprising:

- a) reacting silica with tri- or difunctional organosilanes in an aqueous acid medium to provide a crude product containing organosilane capped silica and organosilicon impurities;
- b) extracting the organosilicon impurities from the crude silica product with an organic liquid to provide a purified product consisting essentially of organosilane capped silica, and then
- c) drying the so purified product to obtain a dry organosilane-capped silica.

Thus, *Menon* describes the need for purification when using di- or tri- functional silanes because of contamination; see col.4 lines 16 et seq. Indeed, the two silanes mentioned in the Final Action, on page 3, line 2; namely, DMDCS and MTCS are singled out by *Menon*

as illustrating the problem of contamination. As described by *Menon* in col. 6, line 39, *et seq.* the benefit is the separation, recovery and reuse of polymeric by-products and organic liquids. Nothing in *Menon* points to problems relating to pulverulent materials.

Menon is focused on obtaining a purified dry organo-capped silica and does not contain any teaching that the mixability of the *Hartmann* silica could be improved by replacing HMDS with the silanes defined by the present claims. Nothing of record teaches the interchangeability of the HMDS of *Hartmann* with the MTCS or DMDCS of *Menon*. Therefore, a person skilled in the art would have no reason to use one in place of another.

The Final Action takes the position that the two citations are combinable because they are concerned with the same field of endeavor, namely silanized silica. Yet not all silanizing agents have been shown to be equivalent. More importantly, the silanizing agents of *Menon* have not been shown to be interchangeable with the HMDS of *Hartmann*. Neither is there any teaching in either reference that would lead a person skilled in the art to think of using the silanizing agents of *Menon* in the compositions of *Hartmann* as a replacement for HMDS in order to reduce mixing time. No advantage or benefit is taught in the prior art that would lead a person skilled in the art to believe that applicants' silanized silicas would enable reduction in mixing time. There is simply no case of *prima facie* obviousness established by the combination of references and therefore the rejection should be withdrawn.

Notwithstanding the "advantages" listed in the Advisory Action of August 13, 2008, for the silicas of *Menon*, the fact is that a person skilled in the art wishing to improve

flowability or improve mixing times would not be persuaded by the “advantages” referred to by *Menon* to use his silanes because *Menon* has nothing to do with improving flowability or mixing time. The teaching in *Menon* that monofunctional silanes (as that of *Hartmann*) are not as reactive and do not result in formation of polymeric organosilicon by products which must be extracted, provides no logical reason to change from the monofunctional silane of *Hartmann* to the compounds mentioned by *Menon*. The alleged lower cost referred to by *Menon* in col. 3, line 37 *et seq.* could be more than offset by the extraction cost. Although the Advisory refers to “stronger, more stable, capping of silicas” those possible attributes have not been shown to have anything to do with improving flowability or reducing mixing times.

As for the “economic benefit” in using MTCS from waste streams, no data is of record establishing that that the overall economic balance is superior to that of *Hartmann*, particularly since an extraction process is needed by *Menon* which is not required by *Hartmann*.

Thus, applicants respectfully submit that *Menon*’s speculative statements as to “benefits” or “advantages” of the materials are totally irrelevant to the issue of flowability and reduced mixing times. In summary, it is clear that a person skilled in the art having the knowledge of the prior art would find nothing in the combination of references that would suggest that applicants’ silanized and structurally modified silicas would have improved properties as explained above. The references do not render applicants’ claims *prima facie* obvious and, therefore, the rejection should be withdrawn.

Applicants again traverse the rejection of Claims 2 and 14 under 35 U.S.C. § 103 (a) in view of *Hartmann, et al.*, taken with *Menon* and request reconsideration. Claims 2 and 14 are method claims directed to the method of improving the flowability of pulverulent materials by adding applicants' treated metalloids, metallic oxides or treated silicas to the pulverulent materials. *Hartmann* and *Menon* have already been discussed and the remarks made above apply here as well.

Menon does not disclose any pulverulent material and contains nothing that would suggest how pulverulent materials can be improved in any way. Neither does the record establish the interchangeability of any of the silanes of *Menon* with the HMDS of *Hartmann*. The Final Action says that a person skilled in the art would have selected the silanes of *Menon* because they are economical and environmentally beneficial. Yet, there is no evidence that *Menon's* silanes are any more economical or beneficial than is HMDS. Speculation as to possible benefits cannot be the basis for rejection. More importantly, a teaching as to benefits relating to cost and the environment does not teach anything with respect to improving flowability or reduction in mixing times. Hence, the Final Action fails to make out a case of *prima facie* obviousness for the subject matter of Claims 2 and 14. Therefore, applicants request that the rejection be withdrawn.

Applicants again traverse the rejection of Claims 4, 6, 8, 9, 11 and 12 under 35 U.S.C. § 103(a) in view of *Hartmann* taken with *Menon* and request reconsideration. Both of these references are discussed above and the remarks apply here as well. The rejected claims are

drawn to compositions containing pulverulent materials and the silanized metalloid, metal oxide or silanized silica. The Final Action takes the position that a person skilled in the art would be lead to employ the silanized silicas of *Menon* in the *Hartmann* compositions because the *Menon* silanes are economical and environmentally beneficial. However, there is no evidence on record that *Menon's* silanes are any **more** economical or beneficial than the HMDS of *Hartmann*. Neither of the references teach anything with regard to how to improve flowability and/or mixing times. Hence, the motivation to make the interchange of *Menon's* silanes for HMDS is lacking. A person skilled in the art would have no reason to make the change in the absence of evidence that there would be some benefit or advantage in doing so. That evidence is lacking in the present record. Therefore, applicants respectfully submit that the combination of references fails to establish *prima facie* obviousness. Withdrawal of the rejection is requested.

With regard to the rejection of Claim 10 under 35 U.S.C. § 103(a) in view of *Hartmann* taken with *Menon* further in view of *Koehlert, et al.*, US 5,928,723, applicants again traverse and request reconsideration. The two principal references have been fully discussed above and the remarks apply here as well.

The silica according to example 4 is AEROSIL R 974, which is a pyrogenic silica having a surface area of 200 m²/g and which has been surface modified with dimethyldichlorosilane and then structurally modified.

The silica according to example 5 is AEROSIL R 974, which is a pyrogenic silica having a surface area of 200 m²/g and which has been surface modified with dimethyldichlorosilane. It has been structurally modified and then milled.

The silica according to example 9 is AEROSIL R 974, which is a pyrogenic silica having a surface area of 200 m²/g and which has been surface modified with dimethyldichlorosilane. It has been structurally modified, then milled and then tempered.

The silica according to example 2 is AEROSIL R 972, which is a pyrogenic silica having a surface area of 130 m²/g and which has been surface modified with dimethyldichlorosilane and then structurally modified.

The silica according to example 7 is AEROSIL R 972, which is a pyrogenic silica having a surface area of 130 m²/g and which has been surface modified with dimethyldichlorosilane. It has been then structurally modified and then milled.

The AEROSIL R 7200 is a pyrogenic silica, which has a surface area of 200 m²/g and which has been surface modified with methacrylsilane and then structurally modified.

AEROSIL R 8200 is a pyrogenic silica, which has been surface modified with HMDS (Hexamethyldisilazane) and then structurally modified. This silica is according to the document Hartmann (US 5,959,005).

AEROSIL 200 is a pyrogenic silica having a surface area of 200 m²/g.

AEROSIL R 972 is a pyrogenic silica having a surface-area of 130 m²/g which has been surface-modified with dimethyldichloro-silane.

AEROSIL R 972 W is a silica, which has a surface area of 130 m²/g. It has been surface modified with dimethyldichlorosilane and then structurally modified.

All of the AEROSIL products are produced by assignee herein.

Koehlert is relied on in the Final Action to show powdery materials. Powdery materials are well known and the industry is constantly trying to improve the flowability properties of such substances and the speed with which powdering substances can be mixed together. Many different substances have been used in the past to accomplish this purpose and not all have resulted in success. *Koehlert* attempts to address the problem by proposing an esterification process for the treatment of silicas. This reference adds little to the record herein because it does not even relate to silanes technology. Hence, a person skilled in the art and involved with silane modification of silicas would not even consider the *Koehlert* patent to be relevant. There is no suggestion in any of the references that powdery materials defined in Claim 10 could be improved in terms of mixing times. None of the references contain a broad teaching, contrary to the inference in the Advisory Action, as to the suitability of silane surface treated silicas for any and all purposes. Each reference is quite specific as to its teaching and no sweeping generalizations would be understood by those skilled in the art as leading to applicant's invention. The rejection fails to establish *prima facie* obviousness and the rejection should be withdrawn.

In the Advisory Action of September 23, 2008, it is suggested that the claims should be limited to a mixing time of 5 minutes.

The tabulated data in Table 17 is based on the tests described in para. [0108]. Thus, the mixing time is clearly influenced by test conditions. The significance of the data is that applicants' silica, when tested under the same conditions as prior known silicas, will achieve a shorter mixing time (whatever the actual number of minutes) compared to prior known silicas. The precise value of mixing time is not important; it is the relation of applicants' mixing to the mixing time of the prior art silicas that is the important point. Applicants' silica will display a shorter mixing time when compared to prior art silicas tested under the same conditions.

As for the question raised in the Advisory Action of September 12, 2008 with respect to the identification of the various silicas in Table 17, applicants have provided the following information:

The document *Koehlert* (US 5,928,723) describes a very general method to produce surface modified metal oxide and/or organo-metal oxide compositions, comprising esterifying at least a portion of a surface of metal oxide and/or organo-metal oxide composition with at least one esterification agent.

Koehlert does not describe any structurally modified silica nor does he give any hint in that respect.

The esterification agents include alcohols of the general formula ROH (see col. 6, line 65).

There is no hint to use any alkylsilane.

The advantage of the present invention is that after a mixing time of 5 minutes the sieve residue is lower than a silica according to *Hartmann* has been used (see table 17 (AEROSIL R 8200) in comparison to the examples 2 and 7).

The examples 2 and 7 correspond to AEROSIL R 972 which has been structurally modified.

The lower residue value shows that the powder does not agglomerate to larger particles.

That means that the structurally modified silica according to our invention is the anticaking agent.

Koehlert mentions generally that hydrophobic metal oxides and/or organometal oxide compositions may act as a free flow agent for powdered materials to prevent caking (see col. 1, line 57). But *Koehlert* does not give any suggestion to make structurally modified silica.

App. No. 10/532,202
Req. for Reconsid. w/RCE dated Dec. 17, 2008
Resp. to Final OA of Mar. 25, 2008

Favorable action at the Examiner's earliest convenience is respectfully requested.

Respectfully submitted,

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